

CLAIMS

What is claimed is:

- 1 1. A magnetic head coil structure, comprising:
2 an insulating layer;
3 a photoresist layer deposited on the insulating layer;
4 a silicon dielectric layer deposited on the photoresist layer, the silicon dielectric
5 layer having at least one channel formed therein;
6 a conductive material formed in the at least one channel to define a coil structure.
- 1 2. The coil structure as recited in claim 1, wherein the insulating layer includes
2 Al₂O₃.
- 1 3. The coil structure as recited in claim 1, wherein the conductive seed layer
2 includes Cu.
- 1 4. The coil structure as recited in claim 1, wherein the conductive material includes
2 Cu.
- 1 5. The coil structure as recited in claim 1, wherein a grain size of the conductive
2 material is less than half of a smallest dimension of the at least one channel.

- 1 6. The coil structure as recited in claim 1, wherein a resistivity of the conductive
2 seed layer is less than or equal to 8.3 micro-ohm/cm.
- 1 7. The coil structure as recited in claim 1, wherein the silicon dielectric layer
2 includes SiO₂.
- 1 8. The coil structure as recited in claim 1, wherein the at least one channel includes a
2 slope greater than one (1).
- 1 9. The coil structure as recited in claim 1, wherein the slope of the at least one
2 channel facilitates depositing of the conductive seed layer and the conductive
3 material.
- 1 10. The coil structure as recited in claim 1, wherein an aspect ratio of the at least one
2 channel is at least 7.
- 1 11. The coil structure as recited in claim 1, wherein the channels are formed by
2 masking, wherein the masking includes depositing another photoresist layer.
- 1 12. The coil structure as recited in claim 1, wherein at least a portion of the silicon
2 dielectric layer has been removed.

- 1 13. The coil structure as recited in claim 12, wherein the silicon dielectric layer has
2 been removed by chemical-mechanical polishing (CMP).
- 1 14. The coil structure as recited in claim 1, and further comprising an adhesion
2 promoter layer between the silicon dielectric layer and the photoresist layer.
- 1 15. The coil structure as recited in claim 1, wherein the conductive seed layer
2 includes a magnetic material.
- 1 16. The coil structure as recited in claim 1, wherein the conductive material includes a
2 magnetic material.
- 1 17. The coil structure as recited in claim 16, wherein the magnetic material is selected
2 from the group consisting of NiFe, CoFe, and CoNiFe.
- 1 18. The coil structure as recited in claim 1, wherein the coil structure includes a P2
2 pole tip structure.
- 1 19. A disk drive system, comprising:
2 a magnetic recording disk;
3 a magnetic head including a coil structure as recited in claim 1;
4 an actuator for moving the magnetic head across the magnetic recording disk so
5 the magnetic head may access different regions of the magnetic recording disk; and

6 a controller electrically coupled to the magnetic head.

1 20. A magnetic head coil structure manufactured utilizing a process, comprising:
2 depositing an insulating layer;
3 depositing a photoresist layer on the insulating layer;
4 depositing a silicon dielectric layer on the photoresist layer;
5 masking the silicon dielectric layer;
6 etching at least one channel in the photoresist layer and the silicon dielectric
7 layer;
8 depositing a conductive seed layer in the at least one channel; and
9 filling the at least one channel with a conductive material to define a coil
10 structure.

1 21. A disk drive system, comprising:
2 a magnetic recording disk;
3 a magnetic head including a coil structure as recited in claim 20;
4 an actuator for moving the magnetic head across the magnetic recording disk so
5 the magnetic head may access different regions of the magnetic recording disk; and
6 a controller electrically coupled to the magnetic head.

1 22. A magnetic head coil structure manufactured utilizing a process, comprising:
2 depositing a conductive layer;
3 depositing a photoresist layer on the conductive layer;

- 4 depositing a silicon dielectric layer on the photoresist layer;
- 5 masking the silicon dielectric layer;
- 6 etching at least one channel in the photoresist layer and the silicon dielectric
- 7 layer;
- 8 filling the at least one channel partially with a conductive material; and
- 9 removing the photoresist layer, the silicon dielectric layer, and the conductive
- 10 layer to define the magnetic head coil structure.